

# Predictive Analytics to Improve Student Outcomes



**Dr. Kate Akers**

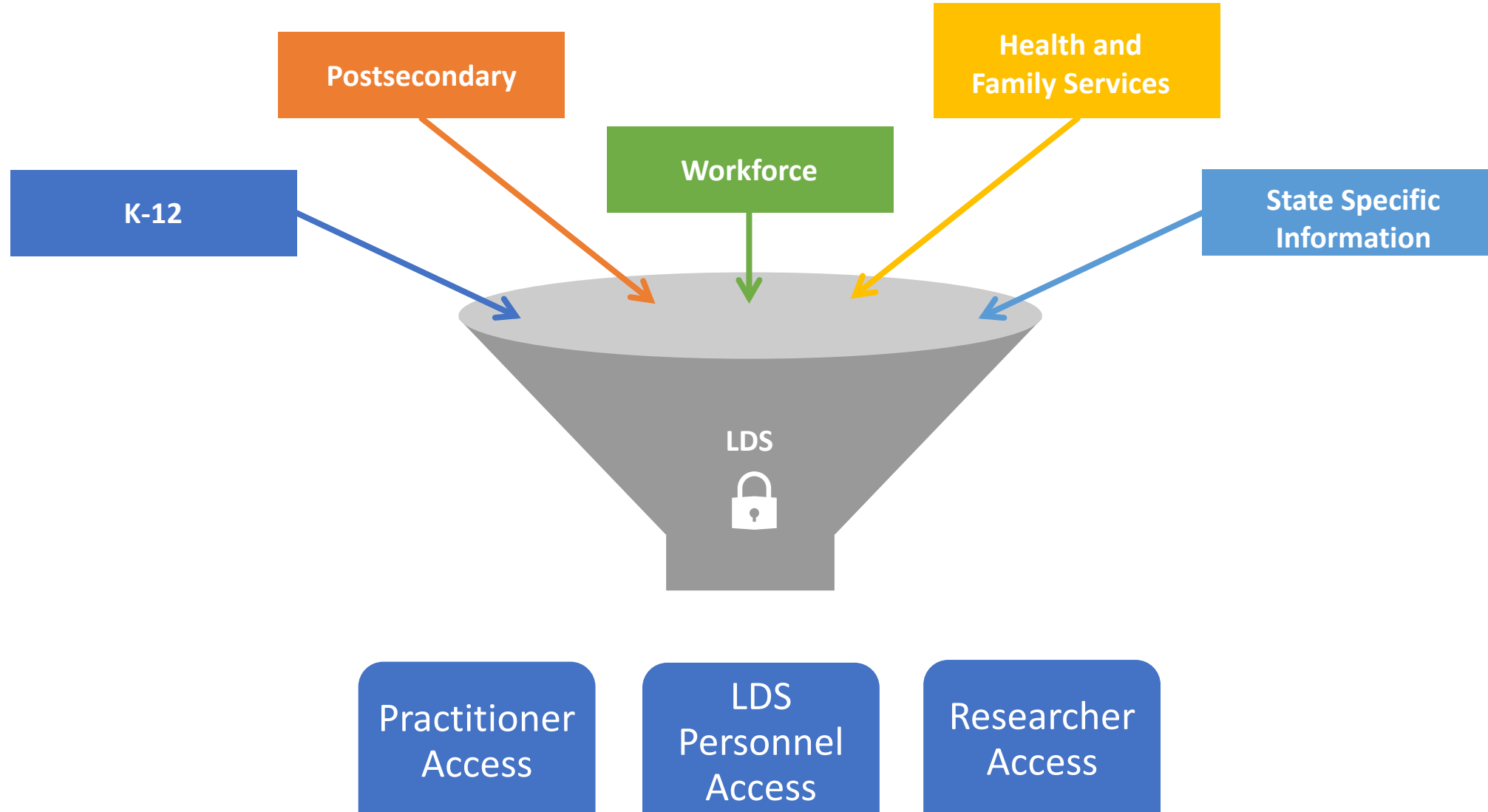
**Pennsylvania State  
System of Higher  
Education**



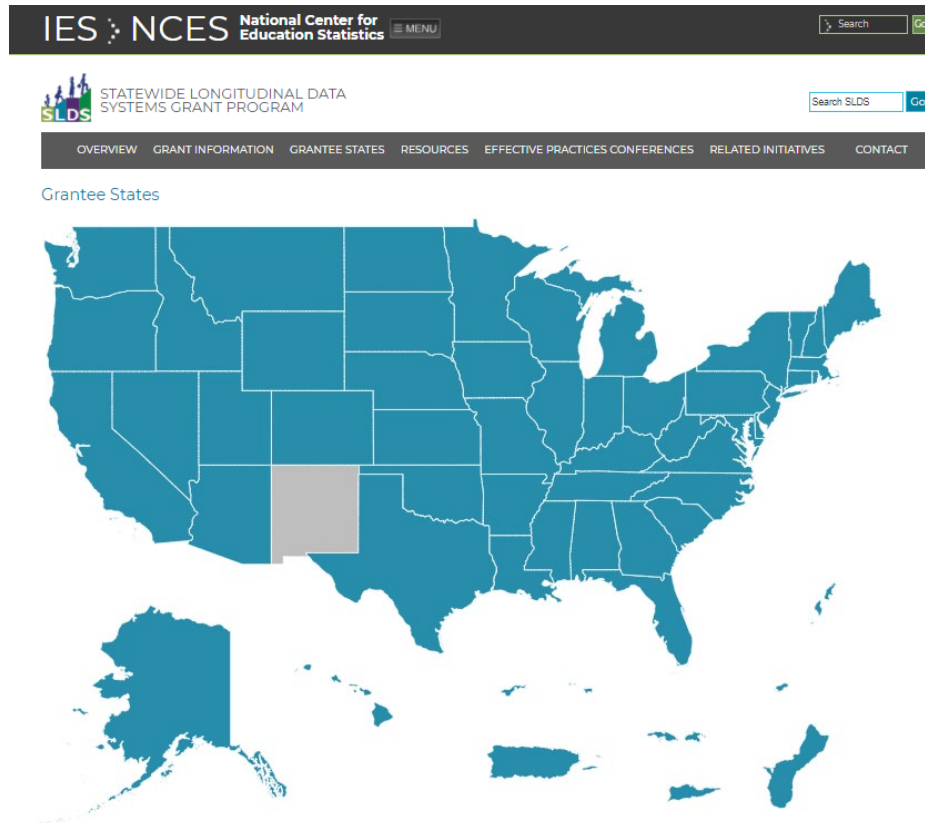
# Integral Components of Longitudinal Data Systems (LDS)



# Exploring an LDS Model



# Does Your State Have an SLDS?



## SLDS Grants Awarded:

- November 2005 (FY 2006 Grantees): 14 states
- June 2007 (FY 2007 Grantees): 12 states and the District of Columbia
- March 2009 (FY 2009 Grantees): 27 states
- May 2010 (FY 2009 ARRA Grantees): 20 states
- May 2012 (FY 2012 Grantees): 21 states, the District of Columbia, Puerto Rico and the Virgin Islands
- October 2015 (FY 2015 Grantees): 15 states and American Samoa
- March 2020 (FY 2019 Grantees): 26 states, Guam and Commonwealth of Northern Mariana Islands
- **55 state and territory grantees**
- **\$826 million in total grants awarded**

# Questions?



**Ben Bond, Ben Brandon,  
and Dr. Timothy Renick**

**Georgia State University**



US Dept of Education Analytics Webinar  
September 10, 2020

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# Using Data and Analytics to Eliminate Equity Gaps

Timothy M. Renick, Ph.D.  
Sr. Vice President for Student Success  
twitter: @tim\_renick



GeorgiaState  
University®

54,000+ Students  
Public Research University  
Minority Serving Institution



GeorgiaState  
University®



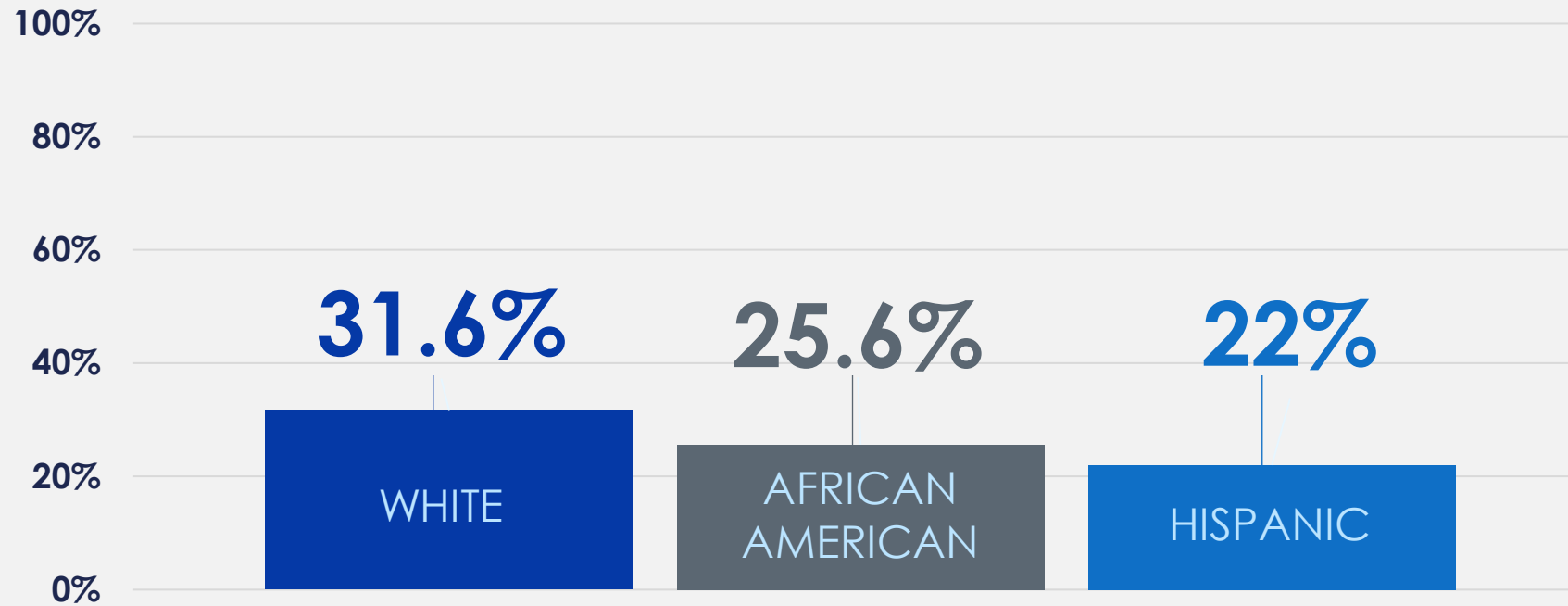


SYSTEM OF GA. CENTER  
EVENING AND DAY CLASSES 24

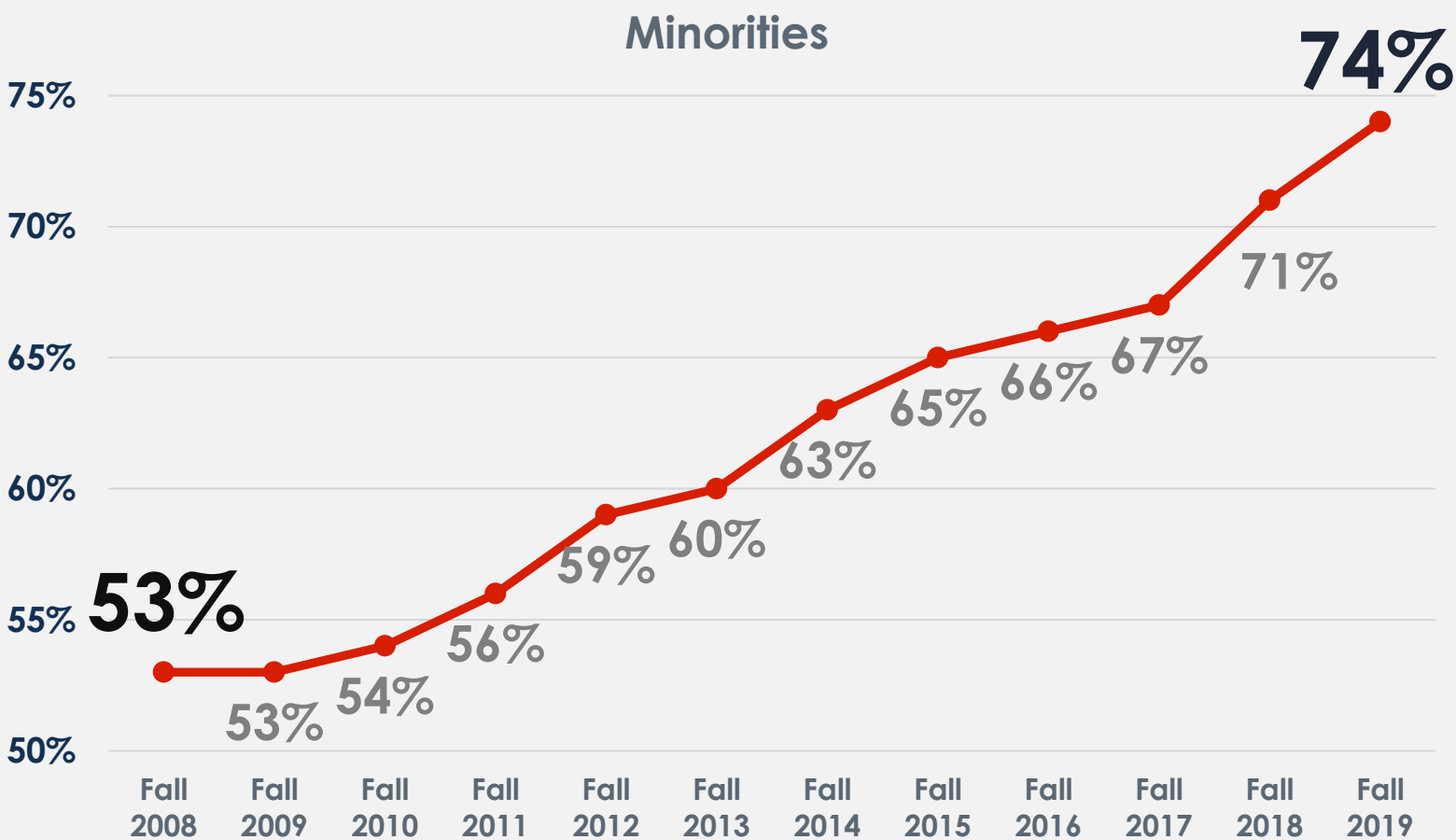
# Graduation Rates by Race & Ethnicity



Where we were: 2003



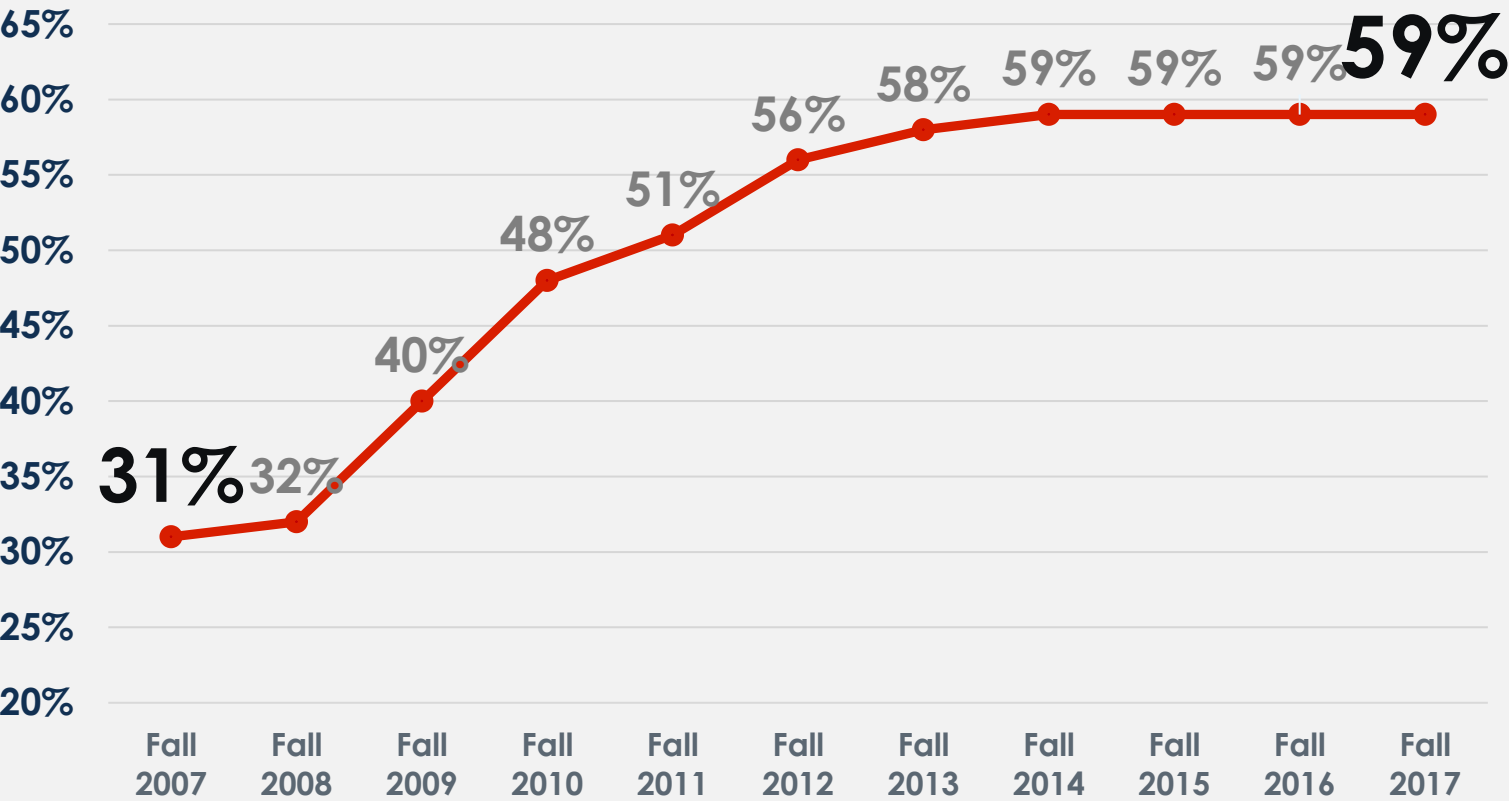
# Changing Demographics: Race & Ethnicity



# Low-Income Students

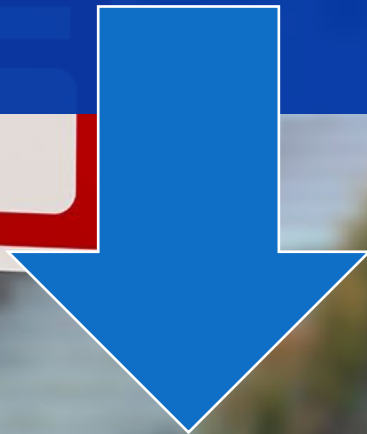


Percent of Georgia State Undergraduates on PELL



Appropriations Cuts

**-\$40 million**





Are We the  
Problem?

# 19%

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Percent of Confirmed Freshmen Who Did Not Enroll  
Summer 2015



Fall 2015

Confirmed GSU Freshman Who  
Never Attended Any College: **278**

Non-white **76%**

First Generation **45%**

Low Income **71%**

Avg. High School GPA **3.34**

# The Hidden Obstacles to Enrollment



- Federal Financial Aid Application
- Verification Request
- State of Georgia Immunization Proof
- Taking Placement Exams
- Registering for Classes
- Transcripts



# A.I.-enhanced Chatbot: 24/7 Help



Which parent do I use on the FAFSA?

Jan 19 2017 6:38:13 PM

For info on which parent's information to use on the FAFSA, reply with the option that best describes your parents' marital status: Never Married Unmarried and both parents living together Married Remarried Divorced/Separated Widowed If none of these options are applicable, check out [1.usa.gov/1OgfTcg](http://1.usa.gov/1OgfTcg)

↶ Undo

✓ Approved by AdmitHub AI

Divorced

Jan 19 2017 6:38:40 PM

If your parents are divorced, the custodial parent (or the one you lived with the most in the past 12 months) is usually responsible for filling out the FAFSA. Check out this website to learn more: [1.usa.gov/1OgfTcg](http://1.usa.gov/1OgfTcg)

↶ Undo

✓ Approved by AdmitHub AI

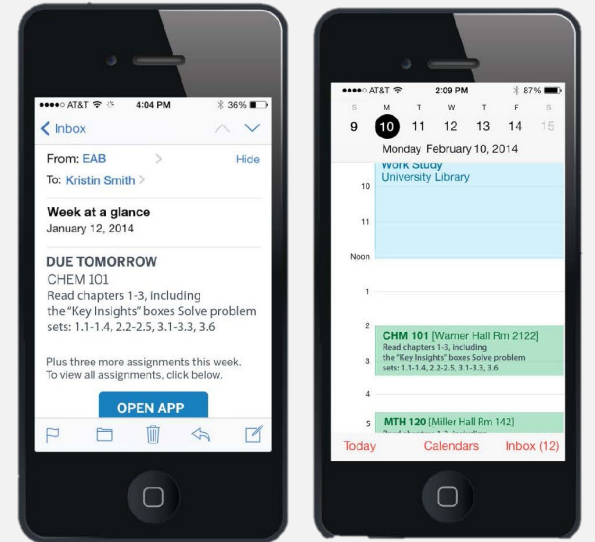
OK and when is it due?

Jan 19 2017 6:39:07 PM

The FAFSA is available starting Oct. 1. Fill it out ASAP! (Use last year's tax info.) Some aid is first-come, first-served, so don't delay! [fafsa.gov](http://fafsa.gov)

✓ Accent

⚠ Reject



185,000



Three-Year Drop in  
Summer Melt: 37%

+362

# 1,000+

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Number of Fully Registered Students Being Dropped  
Each Semester for Non-Payment in 2010-2011

# Who were we dropping



- Seniors
- Academically on track
- Balance below \$1,500



**AVERAGE  
GRANT** **\$900**

Graduated: **86.5%**

Grant Recipients  
Graduated This Year: **1,321**



# Panther Retention Grants



19,000+

*Grants awarded  
since 2011*

# 5,760

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Students Who Dropped Out of  
Georgia State in 2010

# Advisement: GPS Advising

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## Predictive Analytics Project with EAB

**10 YEARS**  
OF DATA

**2.5 MILLION**  
GRADES

**144,000**  
STUDENT RECORDS

**800+**  
ANALYTICS-BASED  
**ALERTS**

**30,000** STUDENTS  
TRACKED **DAILY**

# Registration Tracking and Academic Maps



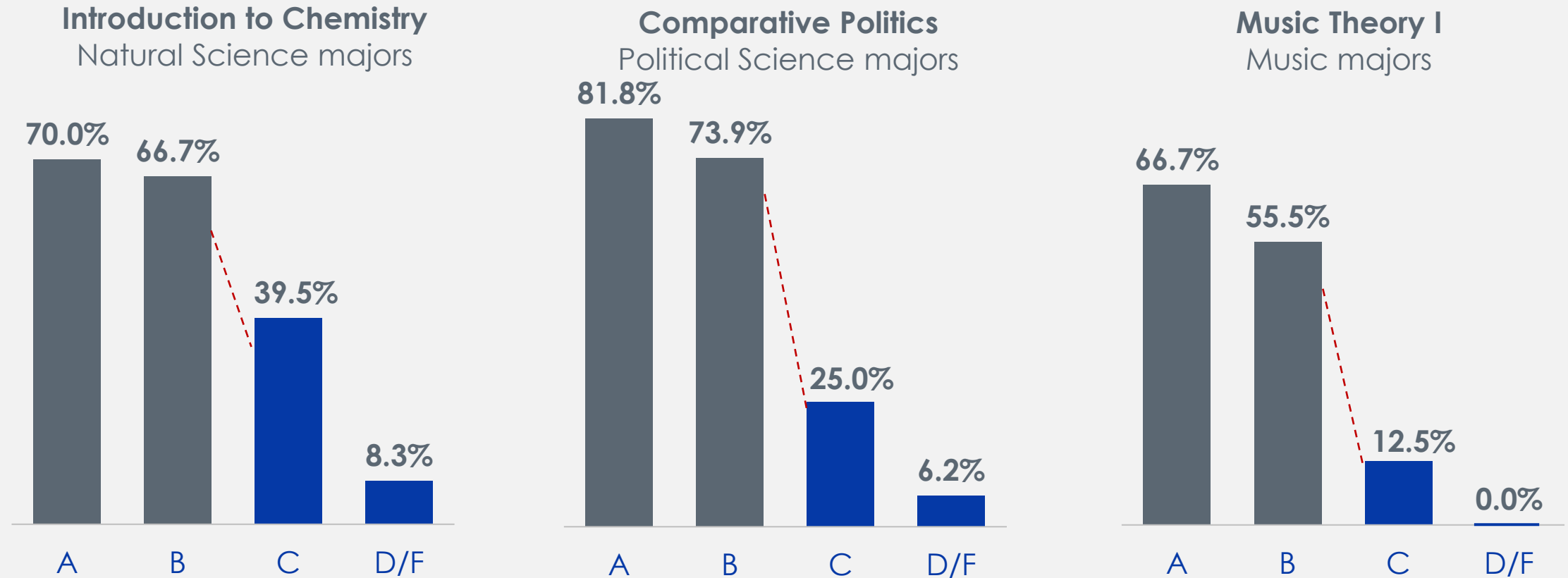
## B.S. in Chemistry

SEMESTER 1	SEMESTER 2
<ul style="list-style-type: none"><li>Complete 1 of ENGL 1101, ENGL 1102 or ENGL 1103 (C or Better)</li><li>Complete MATH 1113 or Higher (B- or Better)</li><li>Complete CHEM 1211K (B- or Better)</li></ul>	<ul style="list-style-type: none"><li>Complete ENGL 1102 or 1103 (C or Better)</li><li>Complete MATH 2211 or Higher (B- or Better)</li><li>Complete CHEM 1212K (B- or Better)</li><li>Maintain a cumulative GPA of 2.25 or Better</li></ul>
SEMESTER 3	SEMESTER 4
<ul style="list-style-type: none"><li>Complete CHEM 2400 (B- or Better)</li><li>Complete MATH 2212 (C or better)</li><li>Complete PHY 2211k (C or better)</li></ul>	<ul style="list-style-type: none"><li>Complete CHEM 3410 (C or better)</li><li>PHY 2212k (B- or Better) (C or better)</li><li>Maintain a cumulative GPA of 2.25 or Better</li></ul>
SEMESTER 5	SEMESTER 6
<ul style="list-style-type: none"><li>Complete CHEM 4000 with a C or Better</li><li>Complete CHEM 4110 with a C or Better</li></ul>	<ul style="list-style-type: none"><li>Complete CHEM 4010 with a C or Better</li><li>Complete CHEM 4120 with a C or Better</li></ul>
SEMESTER 7	SEMESTER 8
<ul style="list-style-type: none"><li>Complete CHEM 4160 with a B- or better</li></ul>	<ul style="list-style-type: none"><li>Complete CHEM 4190 with a C or Better</li></ul>

# Performance in 'Marker' Courses



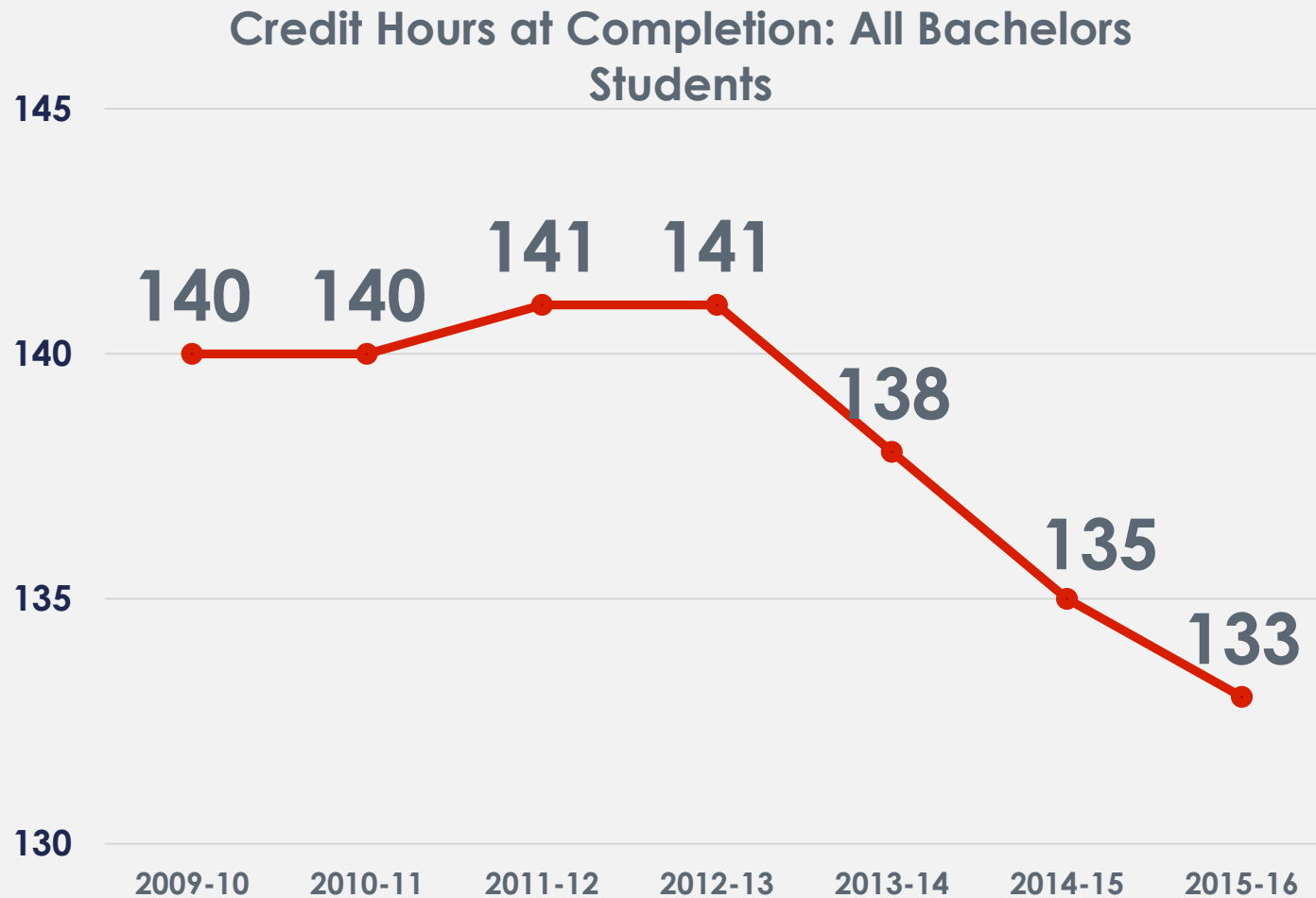
## Graduation Rate in Major by Introductory Course Grade





60,128

# Results: Decline in Time to Degree





## STEM Degrees Awarded Since 2011 (with enrollment change)

Black **+167%** (50%)

Black Male **+221%** (54%)

Hispanic **+388%** (118%)

# Impacts

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# Georgia State Undergraduate Degrees Awarded



2010-11:	2018-19:
<b>4,222</b>	<b>7,303</b>

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INCREASE:  
**3,081 (+73%)**

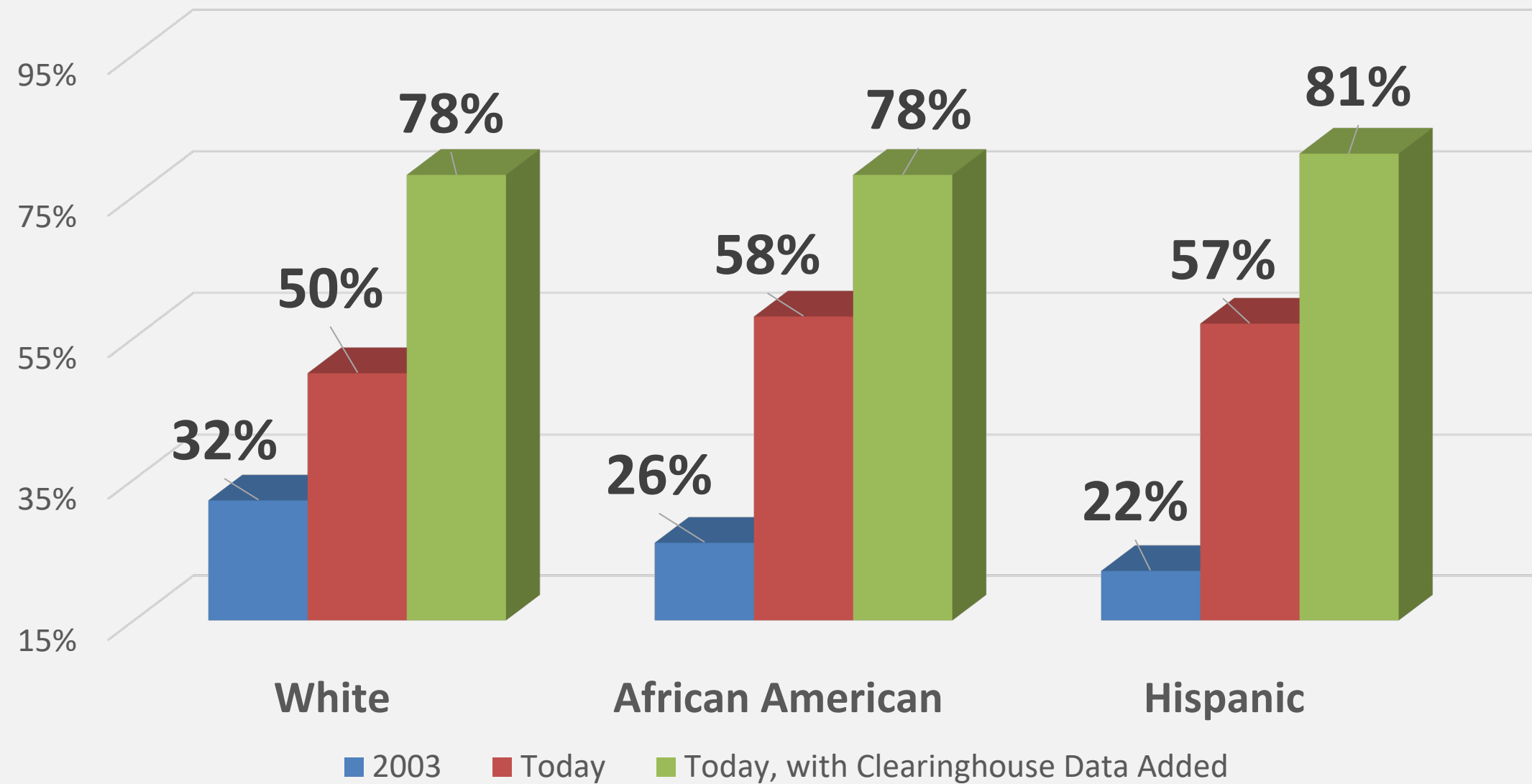
# Bachelor's Degrees Awarded by Group



	2009-10	2018 - 19	Change	% Change
African American	1,001	2,241	<b>+1,039</b>	<b>+124%</b>
Pell	1,298	3,711	<b>+1,659</b>	<b>+186%</b>
Hispanic	196	567	<b>+313</b>	<b>+189%</b>



# Graduation Rates by Race & Ethnicity



# #1 in Degrees Conferred to African Americans



## Top 100 Degree Producers: Non-Profit Universities

2018 African-American Bachelor's - All Disciplines Combined



	Institutions	State	Total	%Grads	%Chg
1	Georgia State University	GA	1,930	38%	7%
2	FAMU	FL	1,477	95%	-7%
3	University of Central Florida	FL	1,401	24%	-1%
4	University of Maryland-University College	MD	1,443	11%	8%
5	Howard University	D.C.	1,194	78%	0%
6	North Carolina A & T State University	NC	1,227	91%	6%
7	Florida International University	FL	1,087	19%	7%
8	Florida Atlantic University	FL	1,054	11%	9%
9	University of Memphis	TN	1,011	33%	3%
10	The University of Texas at Arlington	TX	992	13%	-7%

Source: Diverse Issues in Higher Education, 2018

# COVID-19

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# Questions?



**Brandon McKelvey,  
Linda Sullivan, and  
Diana Pienaar**

**Valencia College and  
The University of  
Central Florida**

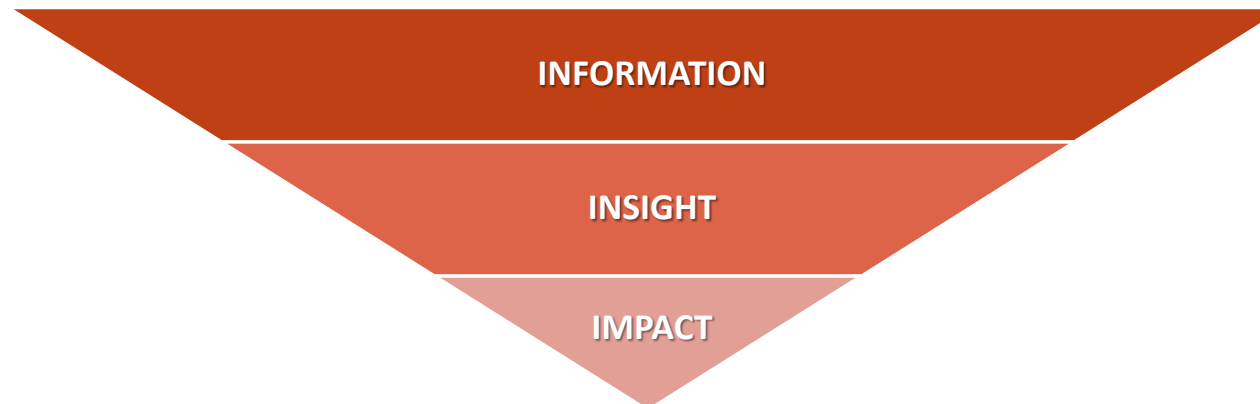




**A model for sharing student data across institutions to improve student academic success.**

# What Is CFEED?

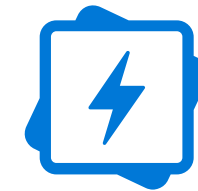
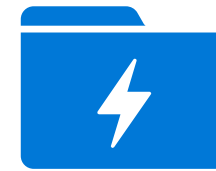
CFEED is an innovative program designed to support student success all along the pre-kindergarten to postsecondary continuum. The Central Florida Education Ecosystem Database (CFEED) brings together four large-scale education institutions under one collaborative initiative to share information, identify opportunities to enhance learning, and propel the educational attainment of all Central Florida students.



# Project Framework

The Capabilities developed and Investments that have been made in the CFEED Program are producing insights and findings from institutional data that have been combined in a single database. The significance of these findings is providing insights about students' academic careers, so stakeholders are making informed decisions and creating interventions that have impact.

INFORMATION



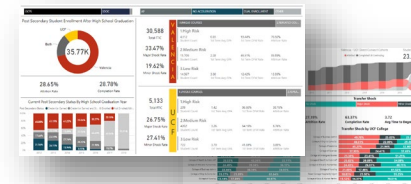
Data is Shared, Synthesized, and Analyzed using the Microsoft Azure Platform

INSIGHT



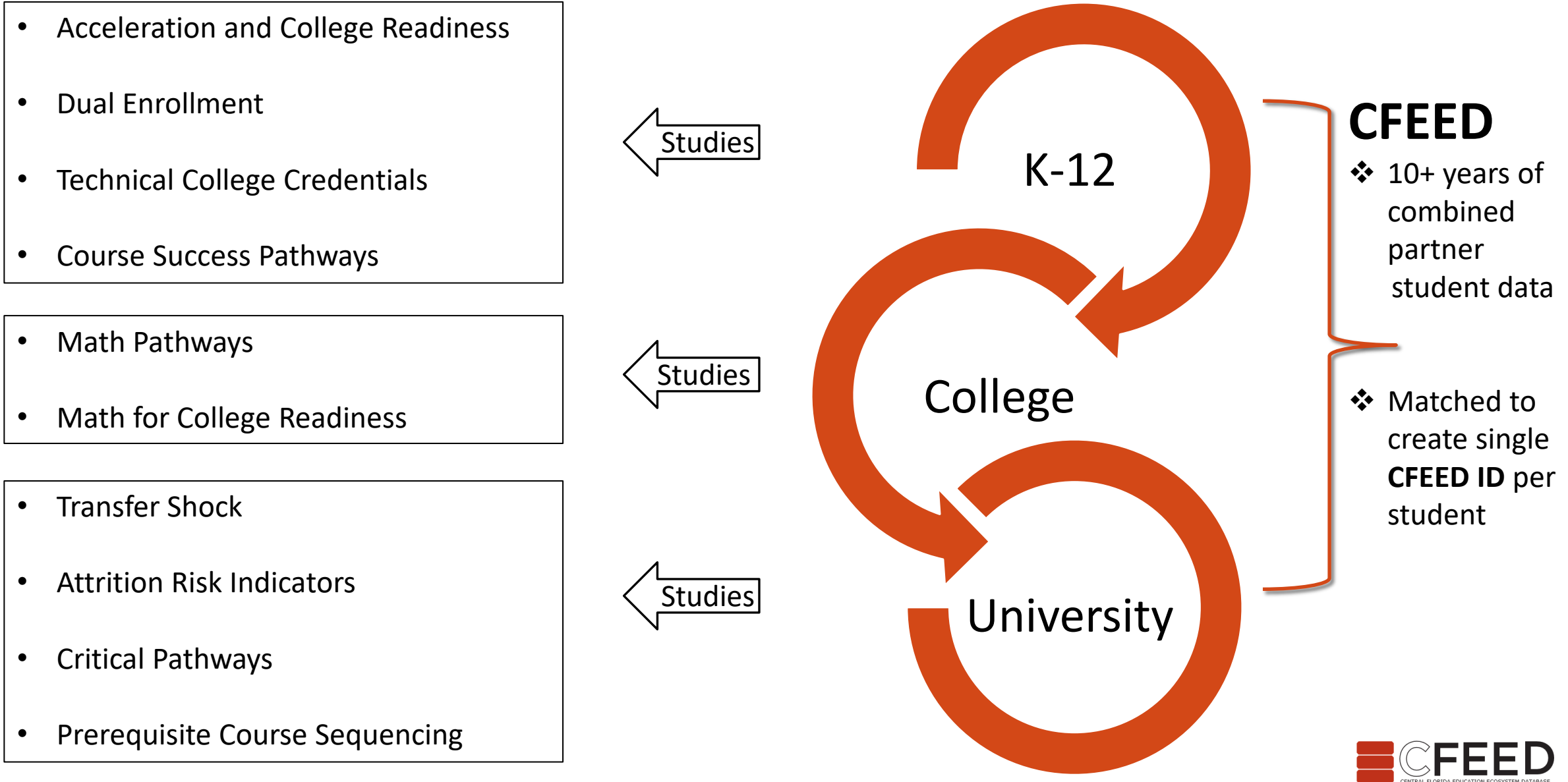
Insights are Developed, Investigated, and Distributed using Microsoft Power BI

IMPACT



Institutions use these studies to inform actions that will enhance student success

# CFEED - Student Experience Kindergarten through University





# **Deeper Dive: Valencia College DirectConnect Students to University of Central Florida – Relevant Courses**

## Project

This project analyzed the characteristics of Valencia College DirectConnect students by UCF entry major to study UCF major readiness and major success:

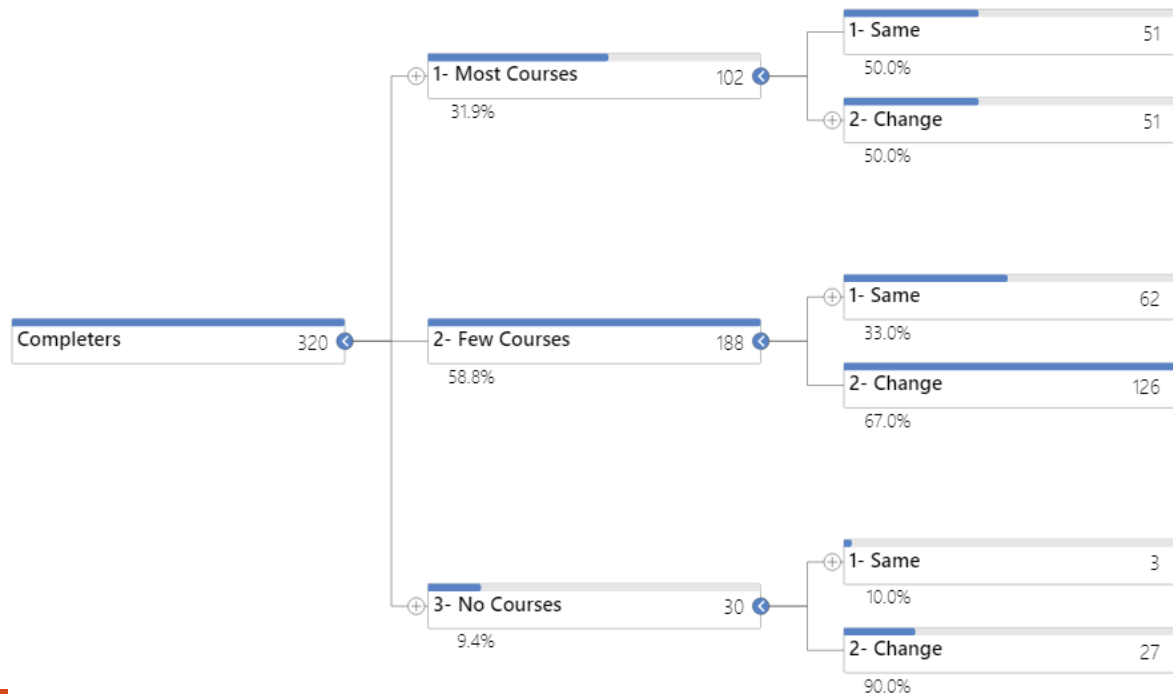
- Are UCF major readiness and major success:
  - the result of the combination of course taking patterns in Valencia College and
  - academic performance in both Valencia College and UCF?
- Do specific courses transferred from Valencia College influence UCF success?
- Does academic performance in Valencia College drive UCF success?
- Does a students' experience during their 1<sup>st</sup> term at UCF influence UCF success?

## VC Direct Connect UCF Entry Major: Biomedical Sciences

Cohorts; 2009-10 to 2015-16 N=487

Completers=65.7% (320) Attritters=34.3% (167)

Relevant Courses	Completers	Attritters	Difference of %	VC Biomedical Transfer Plan
CHM1046C	72% (231)	49% (82)	23%	Yes
CHM2046L	68% (217)	46% (76)	22%	No
MAC2311	57% (183)	38% (63)	19%	Yes
MAC1114	78% (250)	63% (106)	15%	Prerequisite for MAC2311
BSC1011C	58% (186)	43% (72)	15%	Yes



### Students Leaving Biomedical Sciences

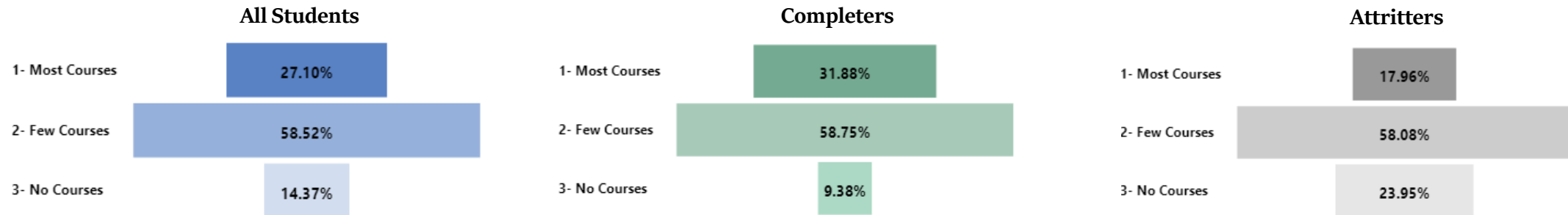
Completers Changing Major	Attritters	Total	Total %
204	167	371	76%

## VC Direct Connect UCF Entry Major: Biomedical Sciences

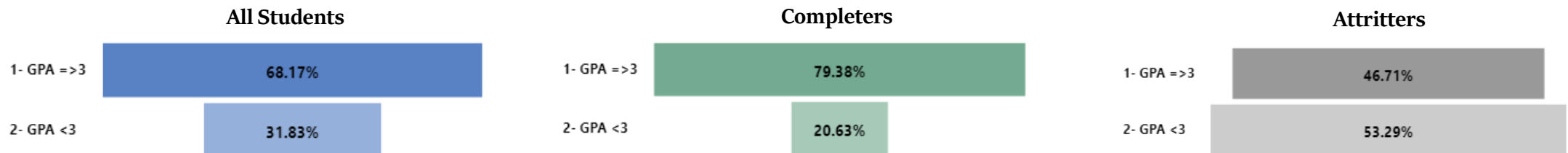
Cohorts; 2009-10 to 2015-16 N=487

Completers=65.7% (320) Attritters=34.3% (167)

Difference in percentage between Completers and Attritters based upon number of Relevant Courses transferred.  
32% of Completers transferred mostly all the Relevant Courses vs. 18% of the Attritters.



Difference in percentage between Completers and Attritters based upon Valencia College Exit GPA.  
79% of Completers had an Exit GPA  $\geq 3$  vs. 47% of the Attritters.



SUMMARY- Valencia College DirectConnect Students  
UCF Major Readiness and Success: Relevant Courses, and Other Metrics  
Project-Coo43

## Findings

Biomedical Science (General attrition rate is 40.9%):

- Of those completers whose **entry major was biomedical sciences only 36% of them graduated from biomedical science**. The more relevant courses that were transferred by completers, the more they graduated from Biomedical Science.
- Attrition rates for students varied depending on the **Exit GPAs and the number of relevant courses transferred**. The more number of relevant courses transferred and the higher the Exit GPA, the lower the attrition rates.
- Attrition rates for students also varied depending on **transfer shock and the number of relevant courses transferred**. Being the higher percentage of completers, those students with no transfer shock and who transferred most of the relevant courses.

# Future Work

Building an ecosystem strategic plan including metrics and aspirational goals

Further developing advanced analytic methods

- Current use of machine learning techniques in Dual Enrollment projects

Constructing ecosystem interventions with our partners

- Strong interest in funding partnerships with state and national colleagues



# Questions?



Todd Brann

University of  
Kentucky



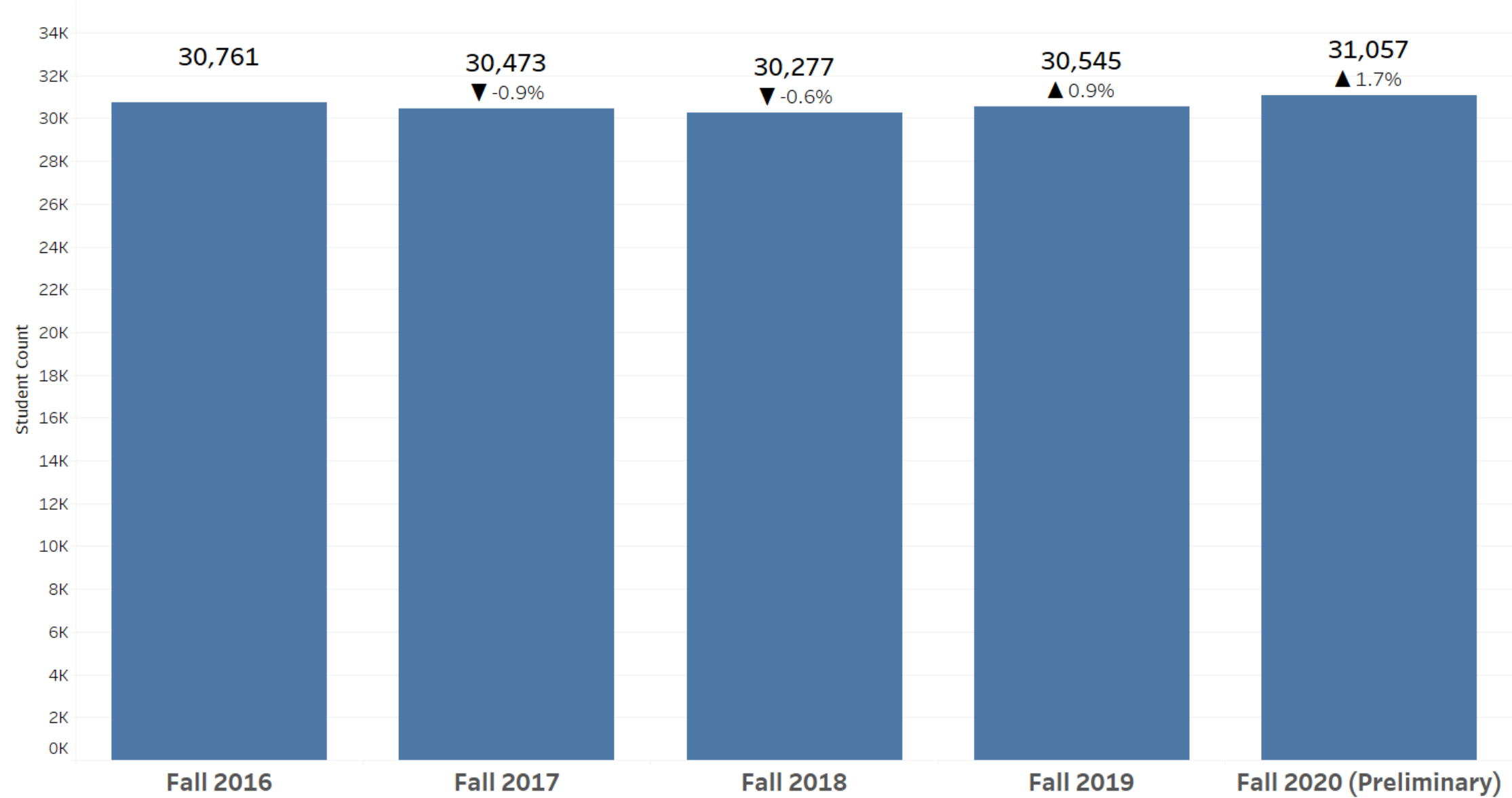
# UNIVERSITY OF KENTUCKY STUDENT SUCCESS AND PREDICTIVE ANALYTICS

Todd Brann, Senior Assistant Provost and Executive Director for Analytics

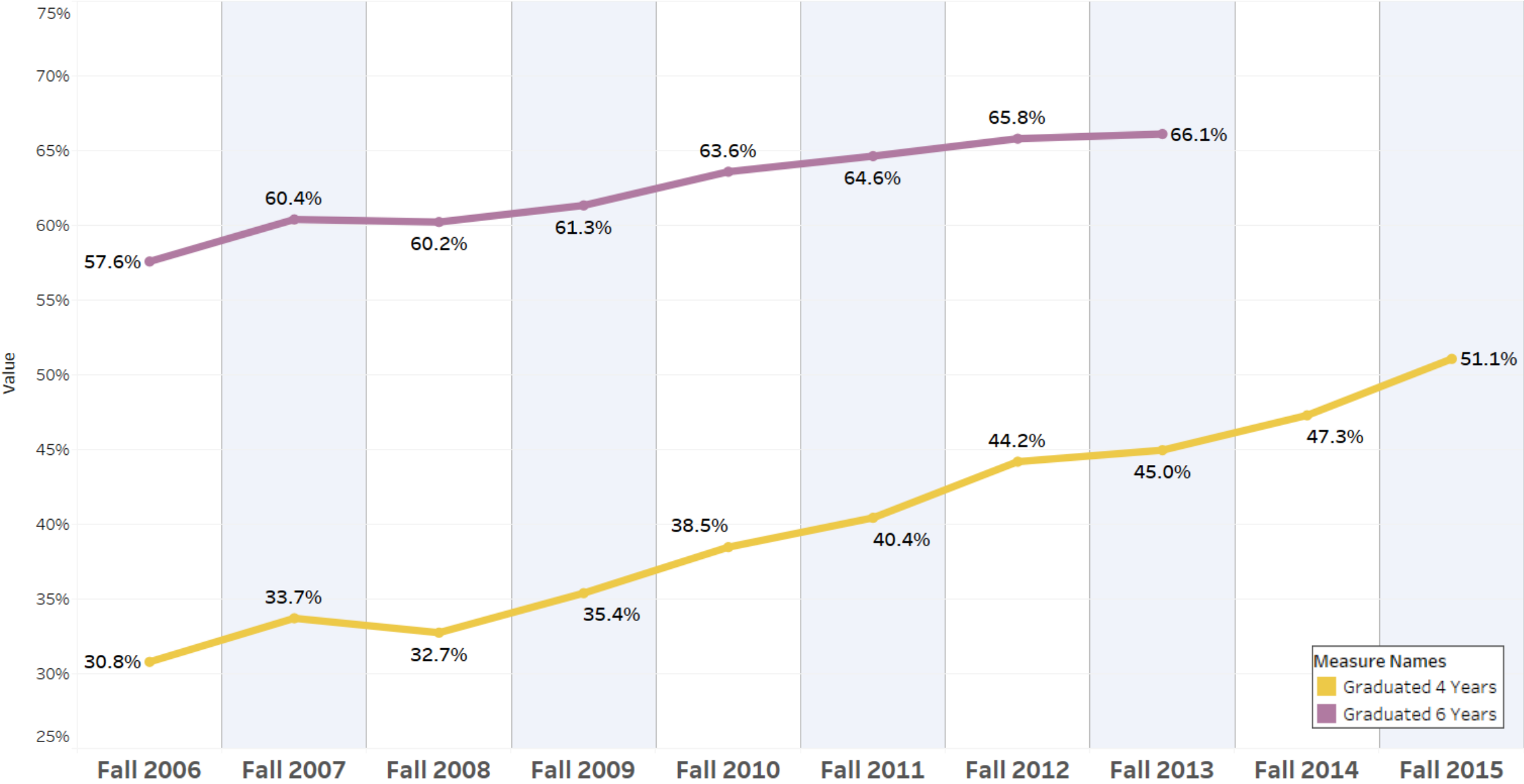


# **BACKGROUND**

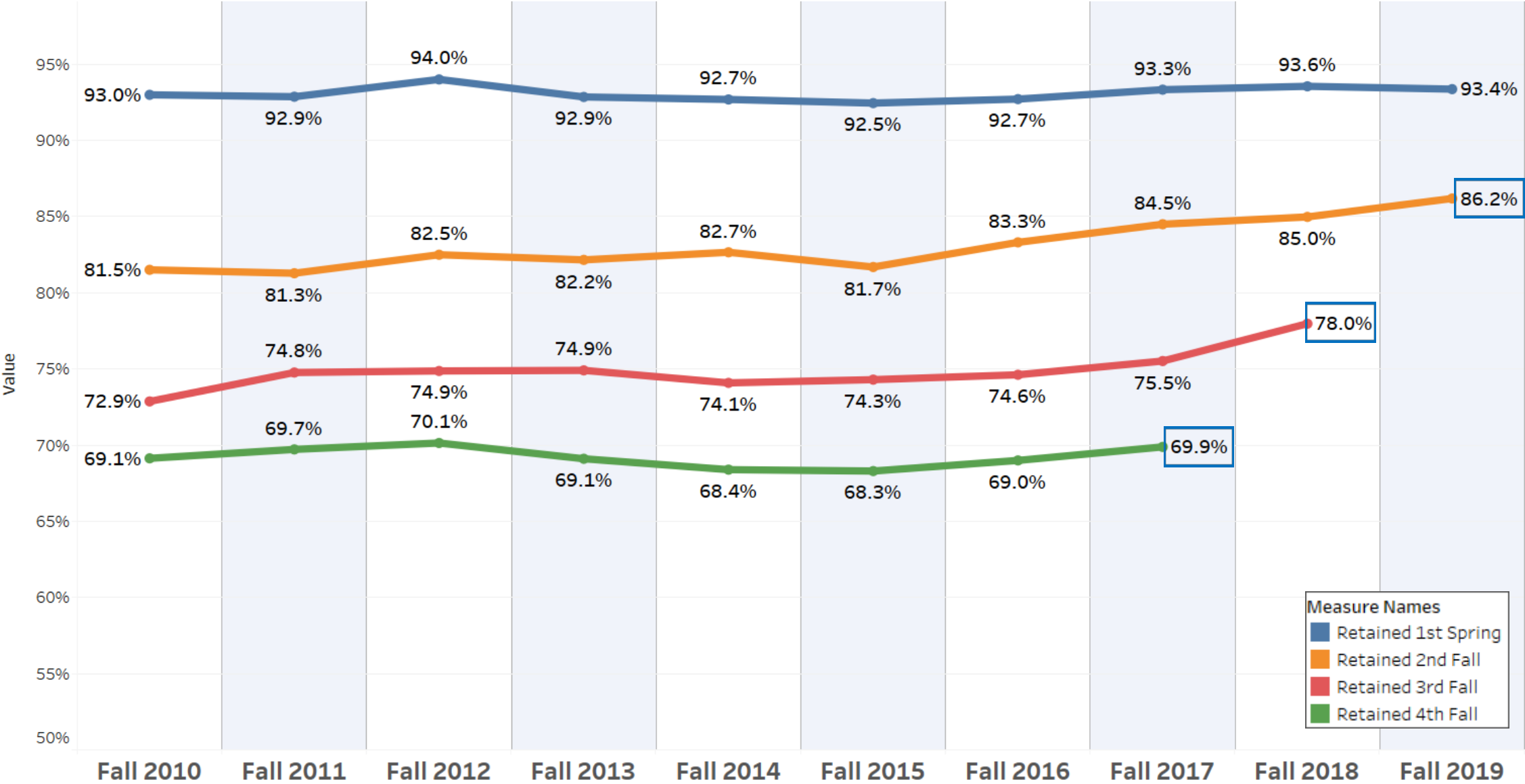
**BACKGROUND – ENROLLMENT**



**BACKGROUND – GRADUATION**



BACKGROUND – RETENTION



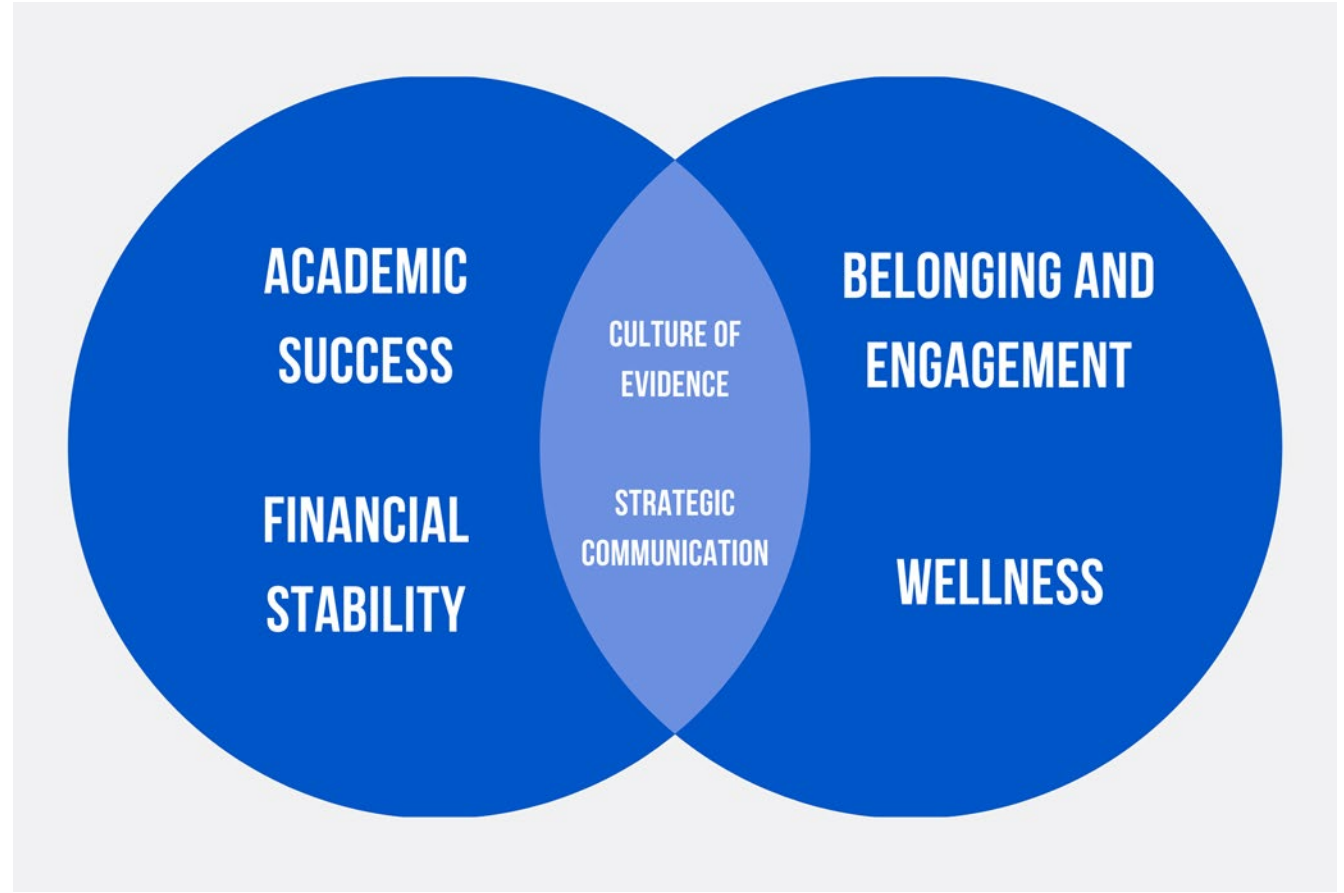
Preliminary Value

# **OUR PRINCIPLES FOR STUDENT SUCCESS**

## OUR PRINCIPLES FOR STUDENT SUCCESS

### Four key elements to student success

- Academic success
- Financial stability
- Belonging and engagement
- Emotional and physical wellness
- Create a culture of evidence with models and analytics
- Align data with strategic communications and outreach



## OUR PRINCIPLES FOR STUDENT SUCCESS

### Wide table concept

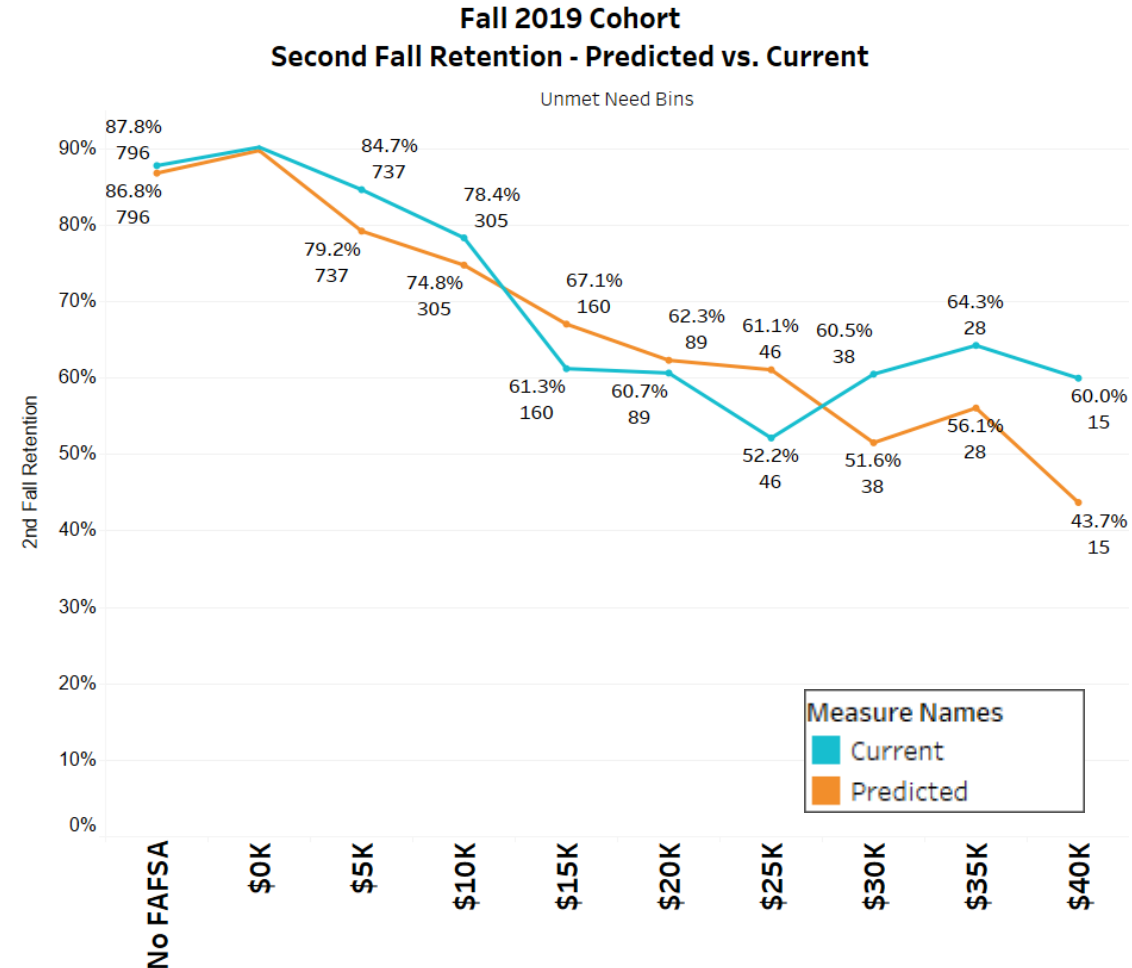
- Campus wide retention meetings held every Friday
- Attended by senior leadership, advisers, associate deans, enrollment management staff, student service personnel, financial aid, etc.
- Goal is to ensure data alignment with campus partners and operations
- Conversations center around aggregate goals, targeted populations and individual students



## OUR PRINCIPLES FOR STUDENT SUCCESS

### Actionable business intelligence

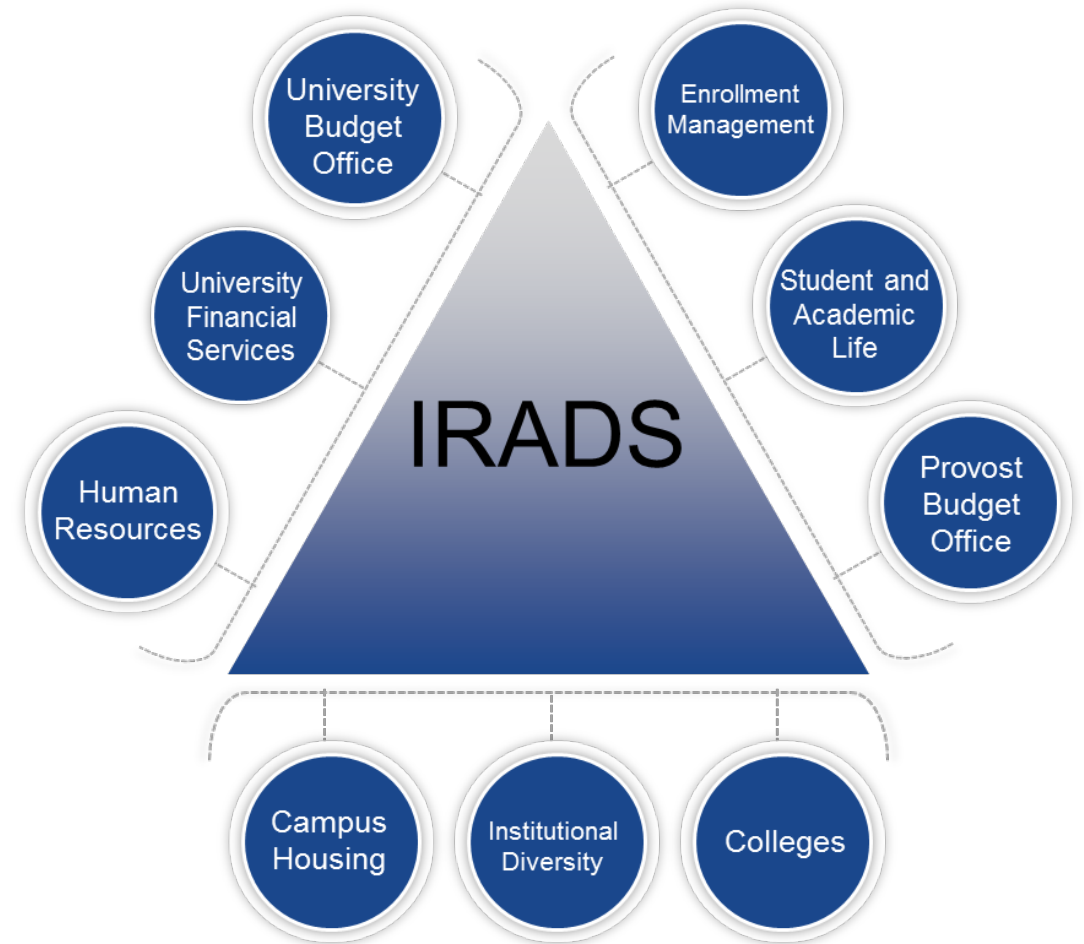
- Data review of predictions and trends kicks off every retention meeting
- Includes predictive model based identification of opportunity students
- More importantly, relentlessly read and react to the data and design the proper interventions in real time
- Always remember that goals and data represent our students' experiences



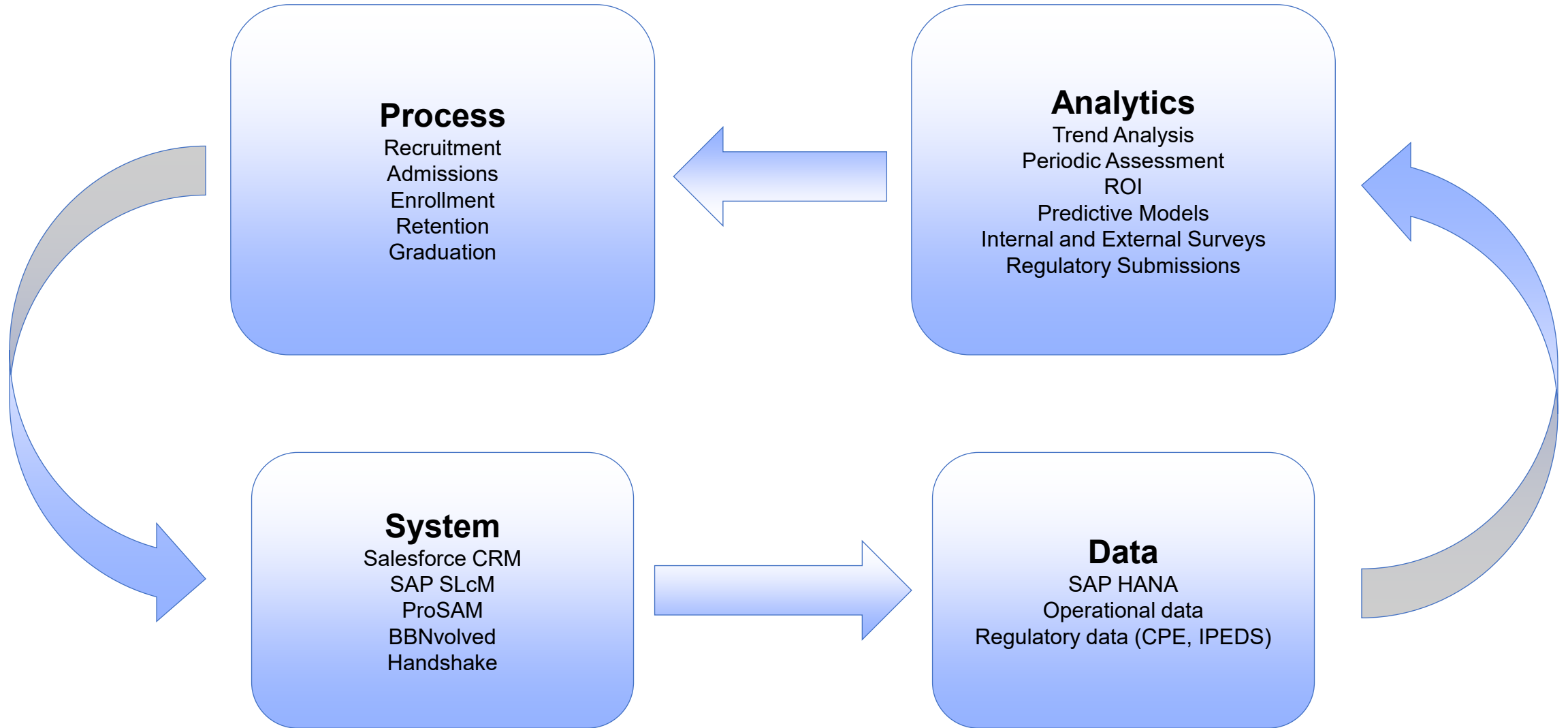
# **INSTITUTIONAL RESEARCH, ANALYTICS AND DECISION SUPPORT (IRADS)**

## Our mission

- Provide reliable, accurate and defensible information
- Meet regulatory reporting requirements
- Surface the necessary data and analytics to anticipate and react to institutional trends
- Optimally position the University to achieve strategic plan goals
- Utilize data throughout the decision-making process

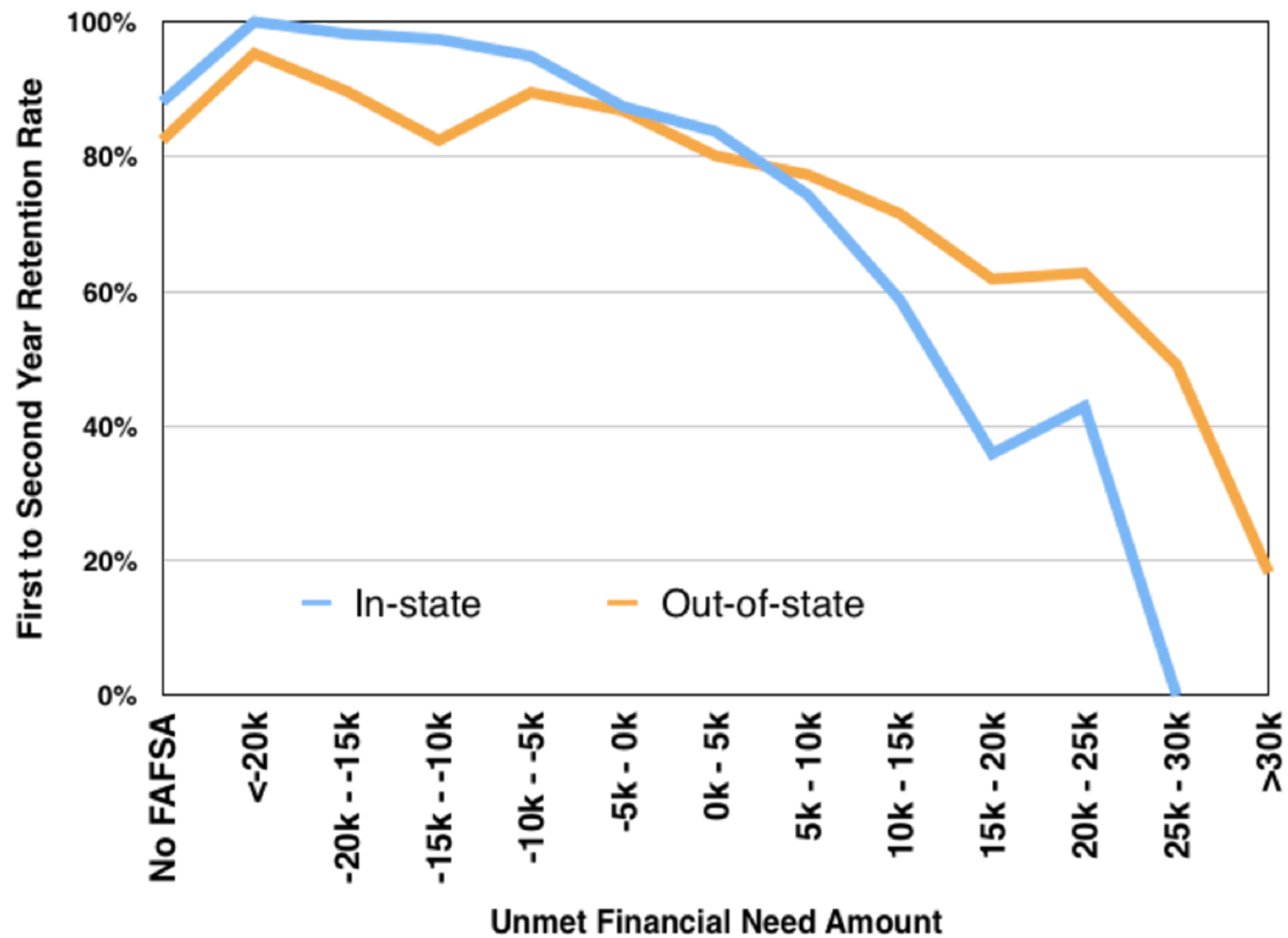


## IRADS – HOW WE WORK



# **UK LEADS - LEVERAGING ECONOMIC AFFORDABILITY FOR DEVELOPING SUCCESS**

**UK LEADS – EFFECT OF UNMET NEED ON RETENTION (BY RESIDENCY)**



## Components

- **One Time Grants** - through the development of a statistical analysis aimed at predicting who is not being retained due to finances, a targeted intervention was administered to increase student persistence
- **KY Futures Scholarship** - by creating a new scholarship aimed at students who are meritorious and also have unmet need, the institution is helping to recruit quality students and address retention issues prior to the start of the students' academic career
- **Financial Wellness and Literacy** - by expanding our Financial Wellness Office and tying institutional aid funds to required financial counseling, we are building out the financial literacy of our students

## Statistical analysis of variables affecting retention

- When weighted high school grade point average was higher = greater retention
- When unmet need was lower = greater retention
- When student account balance was lower = greater retention
- When first semester attempted student credit hours was higher = greater retention
- When a student was a Governor's Scholar, enrolled in UK 101, a student athlete, an honors student, he/she was more likely to be retained
- When a student was a first generation student, a student from Appalachia, a non-resident student, a student living off-campus, a student that submitted a late deposit, he/she was less likely to be retained
- *In-state students were more likely to be dependent on unmet need (they had lower retention rates than out-of-state students with the same unmet need)*

## Strategies for Distributing One Time Grants

- Created 8 different options to identify targeted cohort (One-Time Grant recipients)
- All options contained different combinations of retention indicators, both financial and demographic:
  - Unmet need of \$5K or more
  - First income quartile
  - Financial hold on September 23
  - Account balance of \$5K or more
  - HSRI less than 50
  - First generation
  - Living off campus
- Evaluated each of the options, based on three-year average retention rates in attempt to identify optimal criteria

## Optimal Strategy

- Simulated the effects of an additional need-based award for ALL students with unmet need between \$5K - \$25K
- Selected  $\approx$  200 students whose predicted retention improved the most after receiving an additional grant
- *Based on the model results, these are the students who are in the greatest need of funds to offset their unmet need*

## Optimal Strategy

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- Selected  $\approx$  200 students whose predicted retention improved the most after receiving an additional grant
- *Based on the model results, these are the students who are in the greatest need of funds to offset their unmet need*

## UK LEADS – PROOF OF CONCEPT: FALL 2016 ONE TIME GRANTS

Overall Fall 16 Cohort	Fall 16 to Spring 17	Fall 16 to Priority Registration (end of Academic Year)	Fall 16 to Fall 17	Fall 16 to Spring 18	Fall 16 to Fall 18
Predicted Retention without One- Time Grant	70.8%	56.1%	57.7%	55.2%	51.6%
Predicted Retention with One-Time Grant	90.4%	71.9%	72.9%	68.1%	62.3%
Actual	89.9%	75.3%	75.8%	70.8%	62.4%

## UK LEADS – FALL 2017 ONE TIME GRANTS

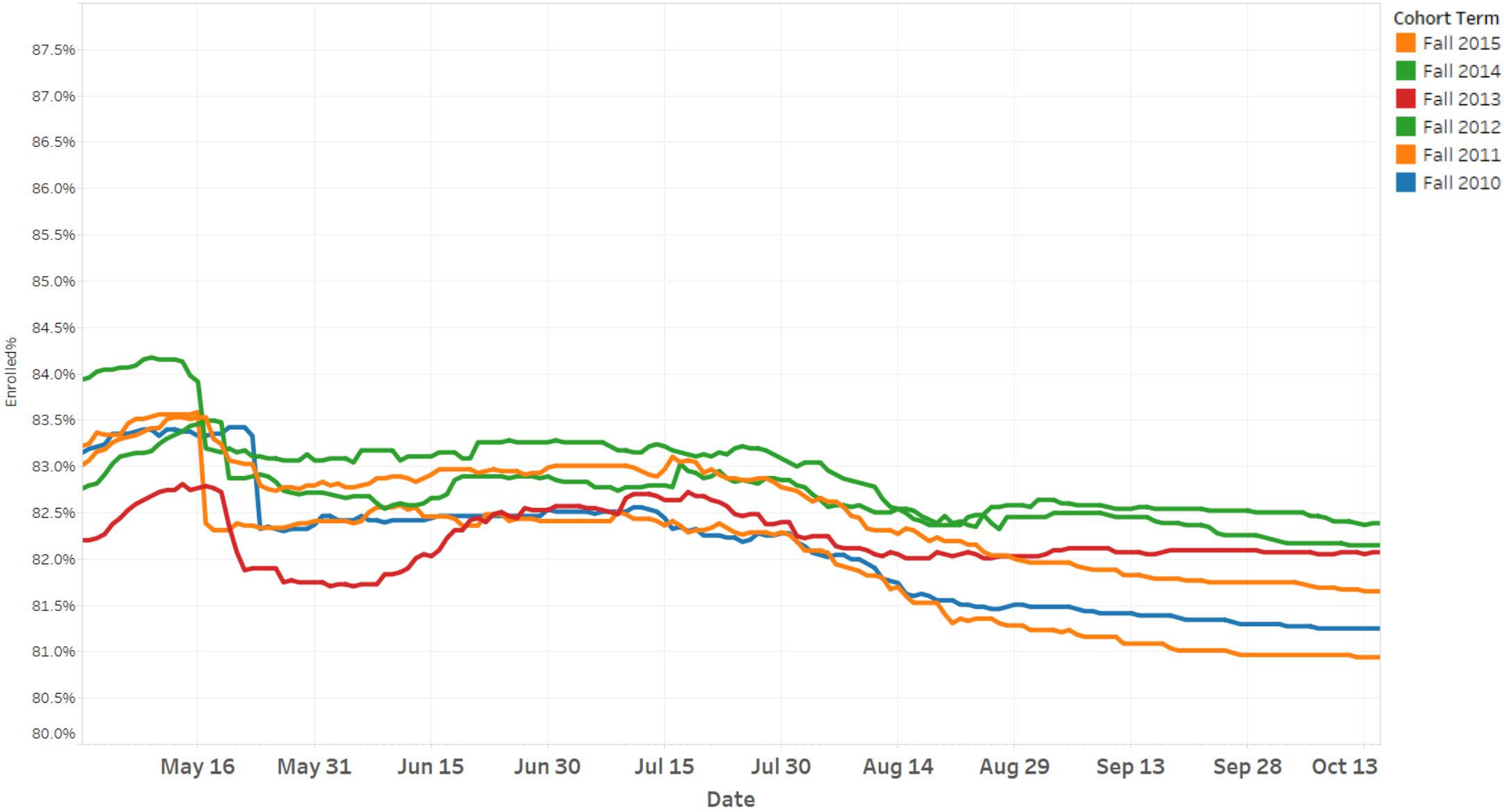
Overall Fall 17 Cohort	Fall 17 to Spring 18	Fall 17 to Priority Registration (end of Academic Year)	Fall 17 to Fall 18	Fall 17 to Spring 19
Predicted Retention without One-Time Grant	68.4%	48.2%	51.9%	43.8%
Predicted Retention with One-Time Grant	87.1%	64.8%	64.4%	56.1%
Actual	89.0%	65.5%	69.0%	58.9%

## UK LEADS – FALL 2018 ONE TIME GRANTS

Overall Fall 18 Cohort	Fall 18 to Spring 19	Fall 18 to Priority Registration (end of Academic Year)	Fall 18 to Fall 19
Predicted Retention without One-Time Grant	73.6%	57.9%	59.1%
Predicted Retention with One-Time Grant	89.7%	71.1%	71.6%
Actual	90.3%	69.3%	74.0%

# **STUDENT SUCCESS IMPACT**

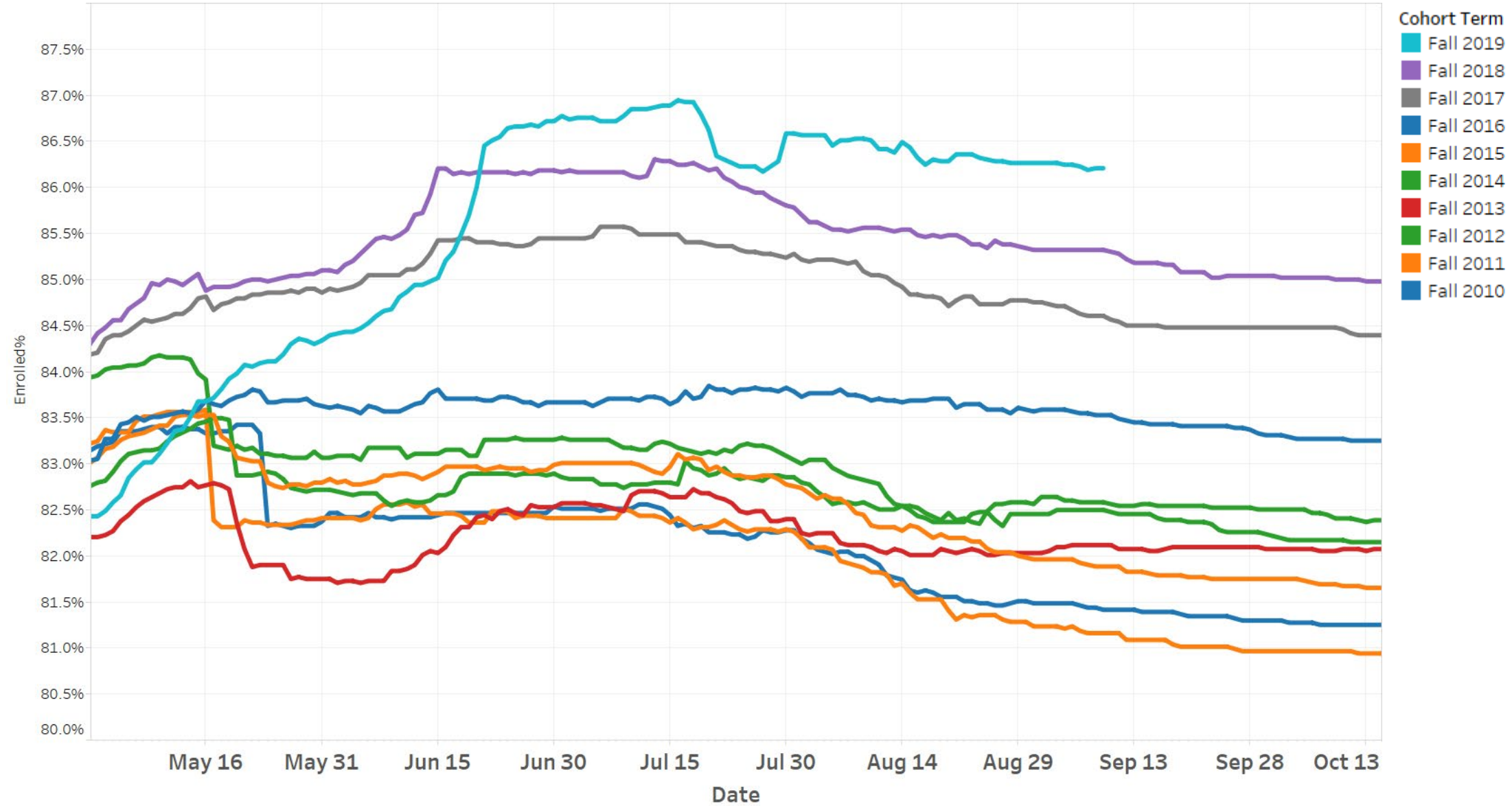
STUDENT SUCCESS IMPACT – SECOND FALL RETENTION: BEFORE



# Strategies

- Efforts organized around:
  - Academic success
  - Financial stability
  - Belonging and engagement
  - Emotional and physical wellness
- Wide table concept
- Actionable business intelligence
  - Predictive models
  - UK LEADS
  - Opportunity students
  - Trend monitoring
- Alignment of data and operations and real time interventions

STUDENT SUCCESS IMPACT – SECOND FALL RETENTION: AFTER



# Questions?



# Dr. Kate Akers

Dr. Kate Shirley Akers joined the State System in January of 2019 as the Assistant Vice Chancellor for Advanced Data Analytics. In this role, she serves as an advisor to the Chancellor and oversees the work of the Advanced Data Analytics Shared Service team. She and her team work closely with university staff and faculty to collect accurate, timely data and create actionable research and reports for the System. Prior to joining the State System, Dr. Akers led the work of the Kentucky Center for Statistics (KYStats), Kentucky's comprehensive, centralized, longitudinal data system. KYStats is responsible for producing meaningful, actionable statistics on Kentucky's education and workforce system. She received national recognition as an education data strategist and thought leader in the areas of longitudinal data and data governance. Dr. Akers began her postsecondary experience at Transylvania University in Lexington, Kentucky where she earned a BA in Mathematics. Discovering her passion for institution and education research, she then pursued a MEd in Higher Education and a graduate certificate in college teaching and learning from the University of Kentucky. She received her PhD in educational policy studies and evaluation with an emphasis in quantitative research methods, measurement, and evaluation from the University of Kentucky.



**[KAkers@passhe.edu](mailto:KAkers@passhe.edu)**

# Dr. Timothy Renick

Timothy Renick is Senior Vice President for Student Success and Professor of Religious Studies at Georgia State University. At Georgia State, he has served as Chair of the Department of Religious Studies and Director of the Honors Program. Dr. Renick has testified on strategies for helping university students succeed before the U.S. Senate and has twice been invited to speak at the White House. His work has been covered by the New York Times, the Wall Street Journal, Time, and CNN and cited by former President Barack Obama. He was named one of the Most Innovative People in Higher Education by Washington Monthly, was the recipient of the Award for National Leadership in Student Success Innovation and was awarded the 2018 McGraw Prize in Higher Education. He is principal investigator for a \$9 million U.S. Department of Education grant to study the impact of predictive-analytics-based advisement on ten-thousand low-income and first-generation students nationally. A summa cum laude graduate of Dartmouth College, Dr. Renick holds his M.A. and Ph.D. in Religion from Princeton University.



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# Ben Brandon

Ben Brandon is the Senior Director for Student Success Analytics at Georgia State University where he serves to leverage insights from data to positively impact the outcomes and experiences of Georgia State students. He has served in research and analytics roles at Georgia State for the last ten years and leads a team responsible for the management and evaluation of a wide portfolio of students success programs, including the administration of Georgia State's chatbot to more than 20,000 undergraduate students. A native of Atlanta, Ben holds a Bachelor's degree in Cognitive Science from the University of Georgia and a Master's in Economics from Georgia State University.



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# Ben Bond

Ben Bond is the Assistant Director of Institutional Research at Georgia State University where he leads the Analysis and Reporting team. Prior to GSU, he was a project manager and HR data analyst at Khalifa University in Abu Dhabi, United Arab Emirates. Before his time overseas, he was a long-time technologist serving in several roles at the University of Texas at Austin. He holds a Bachelor of Business Administration from UT Austin and a Master of Public Administration from Syracuse University's Maxwell School of Citizenship and Public Affairs.



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# Dr. Brandon McKelvey

Brandon McKelvey is an experienced educational administrator with expertise in data analysis, planning and research. He earned a bachelor's degree in sociology from the University of Florida and attended Florida State University as a Presidential Fellow, earning a master's and doctorate of science in sociology. Brandon completed a two-year fellowship with Harvard University and the Center for Education Policy Research through the Strategic Data Project and has served as a member of statewide committees in Florida supporting the implementation of accountability systems and statistical models. Prior to accepting his role at Valencia, Brandon served as the associate superintendent of research, accountability and grants at Orange County Public Schools (OCPS). He also served as the senior director for accountability, research and assessment at OCPS and as a data analyst at Seminole County Public Schools.



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# Dr. Linda Sullivan

Linda Sullivan, Ed.D. is Assistant Vice President for Institutional Knowledge Management (IKM) and also serves as the UCF Institutional Data Administrator to the Florida Board of Governors. In this role, she provides leadership for the offices of Institutional Research and Analytics and Decision Support which includes responsibility for development and delivery of official and ad-hoc reporting, student predictive analytics initiatives, decision-support information, and state and federal reporting. Dr. Sullivan earned her Doctorate in Higher Education Leadership from the University of Central Florida and her MBAA from Embry-Riddle Aeronautical University. She has over thirty years of experience in higher education and had presented widely on the development and delivery of business intelligence at UCF.



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# Diana Pienaar

Diana Edwards Pienaar is the Director of CFEED, a collaborative project focused on determining student success factors based upon data analytics derived from shared data from institutional partners - Valencia College, University of Central Florida, The School District of Osceola County and Orange County Public Schools. Prior to joining Valencia, Diana spent over 28 years in various roles within the Information Technology field. She worked within Research and Development roles in companies focused on Financial Services and Banking, E-Commerce, Logistics as well as Consulting Services at such companies as Gartner, Fiserv, Chep and Convergys prior to moving into Academia. Recently, she was the Sr. Director of Enterprise Project Management at Orange County Public Schools where she focused upon on-time and under budget implementation of Enterprise level software and tools benefiting the K-12 students within Orange County. Diana attended the University of Central Florida where she earned a Bachelor of Arts before obtaining a Juris Doctor in Law from Barry University. She also obtained a Master of Business Administration from the University of Orlando as well as a Master of Laws in International Taxation and Financial Services from Thomas Jefferson School of Law.



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# Todd Brann

Todd Brann is the Senior Assistant Provost and Executive Director for Analytics at the University of Kentucky. Mr. Brann leads the Institutional Research, Analytics & Decision Support group at UK, which provides direct support for the University's enrollment and student success initiatives, leverages data and analysis to inform processes and decision-making and also fulfills regulatory reporting requirements. A University of Kentucky graduate, Mr. Brann has more than 15 years of higher education experience in information technology, enrollment management, analytics and strategic planning, serving as a developer, business analyst, project manager, consultant and principal on a wide variety of system implementations, reporting projects and analytics based initiatives at the University of Kentucky and other institutions.



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